1753
JAW

PATENT
27392/24963

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:

Lautenschlager, et al.

Serial No.: 09/980,026

Filed: March, 29, 2002

For: Device for Implementing Chemical Reactions and Processes in High Frequency Fields

Group Art Unit: 1753

Examiner: Kishor Mayekar

I hereby certify that this paper and the documents referred to as enclosed therewith are being deposited with the United States Postal Service as first class mail, postage prepaid, in an envelope addressed to Mail Stop Petitions, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this date:

June 23, 2004

Jeffrey K. Berger
Registration No. 51,460
Agent for Applicants

PETITION TO WITHDRAW HOLDING OF ABANDONMENT UNDER 37 C.F.R. § 1.181(a) and MPEP §711.03(c)(II)

Mail Stop Petitions
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

This petition is filed to request the withdrawal of the holding of abandonment in the above-referenced application (the "application") because the applicants timely filed a proper Response to an Office action. The applicants further request that the Response to the Office action be entered and the prosecution of this case continue.

An Office action was sent out in the above-referenced file on October 2, 2003 and received in our office. A copy of the Office action is attached as Exhibit A. The applicants were given an extendable 3-month shortened statutory period to respond. A Response to the Office action was sent to the patent office on November 13, 2003 in a timely manner. The response bears an appropriate certificate of mailing and properly responds to the Office action. This response is attached as Exhibit B. The response was received by the patent office on November 17, 2003 as indicated by the

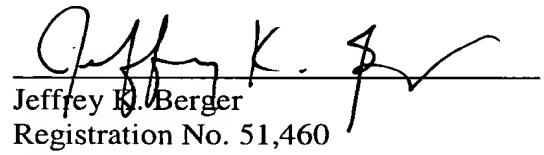
stamped return receipt postcard, a copy of which is attached as Exhibit C. The Notice of Abandonment, attached as Exhibit D, was received on June 22, 2004.

Accordingly, this Petition to Withdraw a Holding of Abandonment should be granted under MPEP §711.03(c)(I). There is no petition fee due. If any fees are due, the Commissioner is authorized to deduct said fees from Deposit Account No. 13-2855. Applicants therefore respectfully request that the holding of abandonment be withdrawn, and the Response to the Office action attached as Exhibit B be entered.

If the Petitions Examiner has any questions, he or she is invited to contact the undersigned.

Respectfully submitted,

MARSHALL, GERSTEIN & BORUN LLP
6300 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606-6357
(312) 474-6300

June 23, 2004 By: 

Jeffrey K. Berger
Registration No. 51,460
Agent for Applicants

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/980,026	03/29/2002	Werner Lautenschlager	27392/24963	3016

7590 10/02/2003

Anthony G Sitko
6300 Sears Tower
233 South Wacker Drive
Chicago, IL 60606-6402

EXAMINER	
MAYEKAR, KISHOR	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 10/02/2003

Docketed: 1-2-04

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

Office Action Summary	Application No.	Applicant(s)	
	09/980,026	LAUTENSCHLAGER ET AL.	
	Examiner	Art Unit	
	Kishor Mayekar	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on a 35 U.S.C. 371 National Stage application of PCT/EP01/03482 filed March 27, 001. It is noted, however, a copy of the certified Germany priority document has not been received.

Specification

2. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

3. The specification is objected because the headings introducing various paragraphs of the specification have been omitted.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC (See 37 CFR 1.52(e)(5) and MPEP 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text are permitted to be submitted on compact discs.) or
REFERENCE TO A "MICROFICHE APPENDIX" (See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.)
(e) BACKGROUND OF THE INVENTION.
(1) Field of the Invention.
(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(f) BRIEF SUMMARY OF THE INVENTION.
(g) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(h) DETAILED DESCRIPTION OF THE INVENTION.
(i) CLAIM OR CLAIMS (commencing on a separate sheet).
(j) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(k) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Claim Objections

4. Claim 10 is objected because the claim does not refer to a preceding claim. See MPEP § 608.01(n).

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-5, 9 and 12-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, the phrase "which can be irradiated" is indefinite for referring to a method of operating the device. The phrases "can be exposed", "being able to be closed", "being fixed on ... engagement connection" and "contains the solid" are also indefinite for referring to a method of operating the device. The phrases "the action" and "the high frequency field" lack antecedent basis.

The phrase "the reactor being fixed on or in the upper wall of" is confusing. The phrase "contains the solid, ... or substance mixtures" is indefinite for referring the containing material as part of the structures of the device. The phrase "rod-like" is indefinite when the term "like" is appended to the otherwise definite term "rod". The phrase "form a pressure-resistant cage" needs to be replaced with the phrase --configured to form a pressure-resistant cage—to eliminate reference to a process of operating the device. The phrase "can be connected " is indefinite for referring to a method of operating the device. The phrase "the wall" is either confusing as to which wall is recited or lacking antecedent basis. The phrase "fixing elements" lacks antecedent basis. The phrase "each of which" is confusing as to which recited structure is referring to. The phrase "a reactor closure" is confusing as to the relation between the closure and the cover. The phrases "the manufacture" and "the positive and nonpositive engagement fixing" lack antecedent basis.

Regarding claim 2, the same is applied to claim 1 to the phrase "rod-like" (thrice occurrences). The phrase "a guide a narrowing" is confusing. Also, the claim is confusing as one time the guide (in line 2) is in singular and the other time it (in last line) is in plural.

Regarding claim 3, the same is applied to claim 1 to the phrase "rod-like". The phrase "the face" lacks antecedent basis.

Regarding claim 4, the same is applied to claim 3 to the phrase "rod-like" (twice occurrences) and "the face".

Regarding claim 5, the same is applied to claim 1 to the phrase "rod-like" (twice occurrences). The term "whereby" is indefinite because the action following the term does not necessarily occurs. And the phrase "whereby, with the securing ... to microwaves" is not completed.

Regarding claim 9, the same is applied to claim 1 to the phrase "rod-like". The phrase "especially ... of the device" is confusing as whether it is part of the claimed device.

Regarding claim 12, the phrase "inserts" lacks antecedent basis.

Regarding claim 13, the phrase "the multiple reaction chambers" lacks antecedent basis.

Regarding claim 14, the same is applied to claim 13.

Regarding claim 15, the same is applied to claim 1 to the phrase "rod-like".

Regarding claim 16, the same is applied to claim 1 to the phrase "rod-like".

Regarding claim 17, the same is applied to claim 1 to the phrase "rod-like".

Allowable Subject Matter

7. Claims 1-19 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

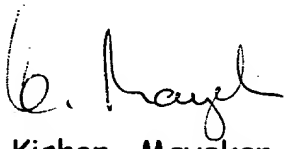
8. The following is a statement of reasons for the indication of allowable subject matter: Because the prior art references do not disclose in a device for carrying out chemical reactions and processes in high-frequency fields the provision of the recited rod elements configured to be connected to an upper wall of a high-frequency chamber in a positive and non-positive manner engagement to secure the upper end of the rod elements individually through fixing elements and each of the rod elements has a guide for holding a crown-shaped holder for a reactor or a lower reactor closure such that the holder is fixed in its position when fixing the upper end of the rod elements in combination with other recited structures as claimed in claims 1-19.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kishor Mayekar whose telephone number is

(703) 308-0477. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Kishor Mayekar
Primary Examiner
Art Unit 1753

KM

Form PTO-1449 (Modified)

U.S. Department of Commerce
Patent and Trademark Office

INFORMATION DISCLOSURE STATEMENT

(Use several sheets if necessary)

Atty. Docket No.	Serial No.
27392/24963	TBA
Applicant	
Werner Lautenschläger, et al.	
Filing Date	**Group**
Here with	TBA

U.S. PATENT DOCUMENTS

*Examiner Initials		Document Number	Issue Date	Name	Class	Subclass	Filing Date If Appropriate
		6,136,276	10/24/00	Flexible Vessel and Frame for Microwave Assisted Chemistry	422/102		1/13/00
		5,427,741	6/27/95	Pressure Resistant Reinforcing Means for Containers for Materials to be Microwave Heated	422/102		5/19/93
		5,520,886	5/28/96	Explosion Resistant Reinforced Container Assemblies for Materials to be Microwave Heated	422/102		1/14/94

FOREIGN PATENT DOCUMENTS

*Examiner Initials		Document Number	Publication Date	Country	Class	Subclass	Translation	
							Yes	No
		EP0916398	3/11/97	GERMANY			Abstract	

EXAMINER

DATE CONSIDERED 9/24/03

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant

Form PTO-1449 (Modified) | U.S. Department of Commerce, Patent and Trademark Office

INFORMATION DISCLOSURE STATEMENT

(Use several sheets if necessary)

Atty. Docket No.	Serial No.
27392/24963	TBA
Applicant	
Werner Lautenschläger, et al.	
Filing Date	**Group**
Here with	TBA

FOREIGN PATENT DOCUMENTS

*Examiner Initials		Document Number	Publication Date	Country	Class	Subclass	Translation	
							Yes	No
C		DE19700499	12/23/96	GERMANY			Abstract	

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)

C		English translation of the International Search Report for Application No. PCT/EP01/03482, filed March 27, 2001.

EXAMINER	DATE CONSIDERED
C. Mayl	9/22/03

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to appli...

Notice of References Cited

Application/Control No.	Applicant(s)/Patent Under Reexamination	
09/980,026	LAUTENSCHLAGER ET AL.	
Examiner	Art Unit	Page 1 of 1
Kishor Mayekar	1753	

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-5,345,066	09-1994	Knapp et al.	219/686
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
ates in MM-YYYY format are publication dates. Classifications may be US or foreign.

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as First Class Mail, in an envelope addressed to: MS Non-Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below.

Dated: November 13, 2003 Signature: _____ (Jeffrey K. Berger)

Docket No.: 27392/24963
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Werner Lautenschläger, et al.

Application No.: 09/980026

Art Unit: 1753

Filed: March 29, 2002

Examiner: K. Mayekar

For: DEVICE FOR IMPLEMENTING CHEMICAL REACTIONS AND PROCESSES IN HIGH FREQUENCY FIELDS

AMENDMENT IN RESPONSE TO NON-FINAL OFFICE ACTION

MS Non-Fee Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

INTRODUCTORY COMMENTS

In response to the Office Action dated October 2, 2003, please amend the above-identified U.S. patent application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper.

Amendments to the Abstract begin on page 7 of this paper.

Remarks/Arguments begin on page 8 of this paper.

An **Appendix** including, a copy of the Abstract on a separate page, a certified copy of the German priority document, a clean version of the amended specification and a marked up version showing changes in the amended specification is attached following page 10 of this paper.

AMENDMENTS TO THE SPECIFICATION

An amended specification including section headings in keeping with the examiners suggestions, term clarification and paragraph numbers is included in the Appendix. Both a clean copy and a copy marked up showing changes are included. The substitute specification includes no new matter.

AMENDMENTS TO THE CLAIMS

Please replace the words "Patent Claims" on page 8, line 1 with the following:

CLAIMS

We claim:

1. (Currently amended) Device for carrying out chemical reactions and processes in high-frequency fields, comprising:

a high-frequency chamber ~~which can be irradiated~~ for irradiating with at least one radiation source[[,]]; and ~~in which~~

a reactor with a closable cover, the reactor for exposing to a ~~can be exposed to the action of the~~ high-frequency field, ~~the reactor being able to be closed by a cover,~~ the reactor being ~~fixed on or in~~ connectively coupled to an ~~the~~ upper wall of the high-frequency chamber through a separable positive and nonpositive engagement connection, the reactor for containing a ~~and contains the~~ solid, liquid and/or gaseous substance or substance mixtures to be investigated or to be treated[[,]] in a pressure-resistant surroundings, wherein ~~rod-like~~ rod elements are provided around the reactor, and configured to form a pressure-resistant cage, which ~~can be connected~~ are constructed to fasten to the upper wall of the high-frequency chamber in a positive ~~and nonpositive~~ manner of engagement to secure them ~~either individually~~ through one or more fixing elements, wherein ~~and~~ each of ~~which~~ the rod elements has a guide for holding a crown-shaped holder ~~for the reactor or a reactor closure~~ where the holder is constructed to be fixed in its position by ~~in the manufacture of~~ the separable positive and nonpositive engagement connection ~~fixing~~ of the ~~rod-like~~ rod elements.

2. (Currently amended) Device according to Claim 1, wherein the ~~rod-like~~ rod elements are cylindrical, ~~and have as a~~ wherein the guide comprises a narrowing of the diameter which does not reach to the end of the ~~rod-like~~ rod element and that the holder preferably has u-shaped grooves which correspond in their position with each of the guides of the ~~rod-like~~ rod elements.

3. (Currently amended) Device according to Claim 1, wherein the one or more fixing elements each ~~consist of~~ comprise a fixing adapter with a threaded bore on ~~the~~ a face, with which the ~~rod-like~~ rod elements can be secured as well as separated with the aid of screw connections on bores in the upper wall and on the cover of the high-frequency chamber.

4. (Currently amended) Device according to Claim 1, wherein the one or more fixing elements ~~consist of~~ comprise a threaded bore on ~~the~~ a face, provided directly in the rod-like elements, through which the rod-like elements can be secured on or separated from bores with the aid of screw connections in the upper wall and in the cover of the high-frequency chamber.

5. (Currently amended) Device according to Claim 3, wherein the cover of the reactor has screw connections corresponding with the position of the bores of the upper wall of the high-frequency chamber as well as with the threaded bores of the ~~rod-like~~ rod elements or their fixing adapter, wherein, when the cover is secured to the upper wall of the high-frequency chamber and the crown-shaped holder is correspondingly fixed in position by the guides of the rod elements, ~~whereby, with the securing of the cover on the upper wall of the high-frequency chamber at the same time the rod-like elements are secured and fixed in their position to clamp the crown-shaped holder, and~~ the high-frequency chamber is closed so that it is tight to microwaves.

6. (Currently amended) Device according to Claim 1, wherein the reactor has an upper reactor closure, which is connected to the cover and, together with this, can be separated from the reactor.

7. ((Currently amended)) Device according to Claim 1, wherein the reactor has a lower reactor closure, which can be separated from the reactor and is provided for holding the crown-shaped holder.

8. (Original) Device according to Claim 7, wherein the crown-shaped holder and/or the lower reactor closure have guide elements for the purpose of fixing the position of the reactor.

9. (Currently amended) Device according to Claim 1, wherein stop elements are provided which facilitate the positive and nonpositive engagement of the ~~rod-like~~ rod elements on the upper wall of the high-frequency chamber, ~~especially~~ wherein the stop elements facilitate ~~for the purpose of~~ rapid and low-cost mounting or changing of the configuration of the device.

10. (canceled)

11. ((Currently amended)) Device according to Claim 1, wherein [[it]] the device is built as a single reactor system.

12. (Currently amended) Device according to Claim 1, wherein, as a multiple reactor system, [[it]] the device is provided with multiple reaction chambers, each of the multiple reaction chambers for holding an insert[[s]].

13. (Currently amended) Device according to Claim 1, wherein the reactor or ~~the~~ a set of multiple reaction chambers are designed as a batch reactor system.

14. (Currently amended) Device according to Claim 1, wherein the reactor or ~~the~~ a set of multiple reaction chambers are designed as a flow-through reactor system.

15. (Currently amended) Device according to Claim 3, wherein the fixing elements further comprise an annular flange through which the ~~rod-like~~ rod elements are secured.

16. (Currently amended) Device according to Claim 4, wherein the fixing elements further comprise an annular flange through which the ~~rod-like~~ rod elements are secured.

17. (Currently amended) Device according to Claim 4, wherein the fixing elements further comprise an annular flange through which the ~~rod-like~~ rod elements are secured.

18. (Original) Device according to Claim 8, wherein the guide elements comprise a cylinder groove and a cylinder flange engaging the cylinder groove.

19. (Original) Device according to Claim 9, wherein the stop elements comprise an annular flange.

20. (New) Device according to Claim 19, wherein the annular flange is designed at the same time as a guide element for the cover and the upper reactor closure.

AMENDMENTS TO THE ABSTRACT

Please add the following abstract to the specification:

Device for carrying out chemical reactions and processes in high-frequency fields includes a high-frequency chamber for irradiating a solid, liquid or gaseous substance while under pressure with at least one radiation source and a reactor for exposing to a high-frequency field. The reactor is connectively coupled to the upper wall of the high-frequency chamber through a sealable connection. Rod or rod-like elements are provided around the reactor and configured to form a pressure-resistant cage. The rod or rod-like elements each have a guide for holding a crown-shaped holder. The holder is fixed in its position by the guides of the rod or rod-like elements. Multiple reaction chambers can be incorporated as a batch reactor system.

REMARKS

Applicants note with appreciation the acknowledgment of foreign priority. A certified copy of the German priority document is attached herewith.

The examiner has objected to the specification for lacking an abstract and section headings. Claim 10 has been objected to as not depending from a preceding claim. Claims 1-5, 9 and 12-17 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-19 have been found to contain allowable subject matter is rewritten or amended to overcome the rejections under 35 U.S.C. § 112, second paragraph. The Applicants respond as follows.

Objections to the Specification

The examiner asserts that there is no Abstract as required by 37 CFR 1.72(b). An abstract on a separate sheet has been provided as an attachment.

The examiner asserts that there are no section headings as provided by 37 CFR 1.77(b). Section headings have been inserted. The specification has been amended to overcome the objections and the Applicants request that the objection be removed.

Objections to the Claims

Claim 10 has been objected to as not depending from a preceding claim. Claim 10 has been canceled and the subject matter entered as new claim 20, depending from claim 19. Withdrawal of the objection is requested.

Section 112 rejection

Claim 1 was rejected under 35 U.S.C. § 112, second paragraph, for phrases referring to a method of operating the device; for referring to material being contained as part of the structure; for the phrase "rod-like" as allegedly being indefinite; for the phrases, "the wall," "fixing elements," "the manufacture," and "the positive and nonpositive engagement fixing" as allegedly lacking antecedent basis. The phrase "reactor closure" allegedly is

confusing. In all claims the phrase "rod-like" has been replaced with the word "rod" as supported in the specification and drawings (Page 4, lines 8-12). As such "rod-like" will not be discussed again with respect to claims 3-5, 9 and 15-17. Claim 1 has also been amended to address the elements allegedly unclear, confusing or lacking antecedent basis.

Claim 2 has been amended to consistently use the term "guide."

Claims 3 and 4 have been amended to state "a face" to address the antecedent basis issue.

Claim 5 has been amended to resolve the indefiniteness incurred by the use of the word whereby.

Claim 9 has been amended to resolve confusion over the phrase "especially ... of the device."

Claim 12 has been amended by replacing the phrase "inserts" with "an insert" and clarifications as to the relationship of the inserts with the multiple reaction chambers.

Claims 13 and 14 have been amended to give antecedent support for the phrase "multiple reaction chambers."

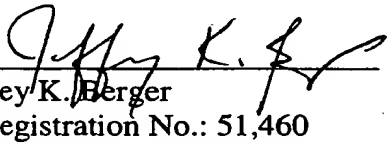
All of the changes made to the specification, abstract and claims have been made for the purpose of clarifying and removing informalities, not for the purpose of adding limitations for overcoming prior art. No limitations have been added nor has the breadth or scope of the claims been reduced in any way by any of the amendments proposed herein.

The Applicants note with appreciation the indication of allowable subject matter and believe that all the issues in the specification, abstract and rejections under 35 U.S.C. § 112 have been addressed and overcome. In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 13-2855.

Dated: November 13, 2003

Respectfully submitted,

By 

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encl:
Abstract
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ABSTRACT OF THE DISCLOSURE

A device for carrying out chemical reactions and processes in high-frequency fields, comprises a high-frequency chamber 2 for irradiating a solid, liquid or gaseous substance while under pressure with at least one radiation source and a reactor for exposing to a high-frequency field. The reactor being connectively coupled to the upper wall 4 of the high-frequency chamber 2 through a sealable connection 3. Rail elements 5 are provided around the reactor, and configured to form a pressure-resistant cage. The rail elements 5 each have a guide 11 for holding a crown-shaped holder 12. The holder 12 is fixed in its position by the guides 11 of the rail elements 5. Multiple reaction chambers can be incorporated as a batch reactor system.

CERTIFIED COPY OF GERMAN PRIORITY DOCUMENT

BUNDESREPUBLIK DEUTSCHLAND

Prioritätsbescheinigung über die Einreichung einer Patentanmeldung

Aktenzeichen:	100 15 794.7
Anmeldetag:	27. März 2000
Anmelder/Inhaber:	Friedrich-Schiller-Universität Jena, Jena/DE; MLS GmbH Mikrowellen-Labor-Systeme, Leutkirch/DE.
Bezeichnung:	Vorrichtung zur Durchführung chemischer Reaktionen und Prozesse in Hochfrequenzfeldern
IPC:	B 01 J, B 01 L, G 01 N

Die angehefteten Stücke sind eine richtige und genaue Wiedergabe der ursprünglichen Unterlagen dieser Patentanmeldung.

München, den 1. Februar 2001
Deutsches Patent- und Markenamt
Der Präsident
Im Auftrag

Joost

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APPENDIX

SUBSTITUTE SPECIFICATION - CLEAN VERSION

TITLE

Device for carrying out chemical reactions and processes in high-frequency fields

TECHNICAL FIELD

[0001] The invention concerns a device for implementing chemical reactions and processes in high-frequency fields. This device permits advantageously the introduction of energy into dissolution, hydrolysis, chemical synthesis, extraction, distillation, drying as well as other reactions and processes.

BACKGROUND

[0002] Frequently, energy input is necessary for the progress, acceleration and/or initiation of chemical reactions and processes. For this purpose, for example, the reaction mixtures are arranged in microwave-permeable reaction containers in a microwave system with a radiation-screened housing and energy is introduced by irradiation with microwaves. Since, in the reactions and processes that occur, frequently high pressures are produced or the reactions proceed only under pressure, the entire arrangement must be pressure-resistant and, for example, must be able to be closed with a cover system. In general, the reaction containers are also equipped with safety equipment and control devices in order to be able to monitor the progress of the chemical reactions and processes.

[0003] Such a device is known, for example, from DE 4 018 955 A1. Among others, a microwave furnace for heating sample material with several pressure-resistant sample containers is described there and the sample containers are arranged on a rotatable carrier part with appropriate holders for the sample containers. In this way, several samples can be treated simultaneously, and, as a result of that, a higher sample throughput can be achieved. A disadvantage is that several pressure-resistant sample containers are needed which can be expensive and thus cost-intensive depending on the design. Furthermore, the reaction volume is limited and, as a rule, pressure and temperature is measured only in one container, as a result of which the

possibilities of application are limited and identical reactions cannot be produced in each individual container because of the inhomogeneities of the microwave field.

[0004] In DE 197 00 499 A1 and in DE 197 48 520 A1, microwave reactor systems are described with a large pressure-resistant holding container in which one or several sampleholders can be arranged in a relatively simple but not necessarily pressure-resistant construction. The disadvantage of this system is the expensive and complicated mounting of the reactor in the microwave oven, the low flexibility, the limited volume and the high expenditure needed for setting up the system.

[0005] Therefore, the task of the invention is to create a device which is suitable for different applications for carrying out chemical reactions and processes in high-frequency fields with high reliability and minimum energy losses, as well as with as little expenditure as possible.

BRIEF SUMMARY

[0006] This task of the invention is solved by providing individual rod or rod-like elements in the high-frequency chamber, and these elements can be attached to the wall of the high-frequency chamber, preferably on the cover of the high-frequency chamber, and form a pressure-resistant cage around the reactor with the analysis material or reagent. This cage for achieving the pressure resistance of the device, which is always required, reduces the high-frequency losses only minimally (depending on the design of the cage), so that, in comparison to the known irradiation devices, a high degree of efficiency is achieved. With the attachment (formation of the positive and nonpositive engagement to the high-frequency chamber or to its cover), at the same time a holder for the reactor is fixed in position, preferably by clamping. In this way, the device can be adapted by suitable selection of the rod-like elements, especially with regard to their number, shape, dimension and material, with a very small economical and operational expenditure, for universal application in the most varied tasks of use (depending on the required pressure-resistance and stability, irradiation treatment, cage-related irradiation losses, among others) and can be equipped and re-equipped within a very short time.

[0007] The possibility that this cage can be realized as a component of a modular system because of its selectable structural design, its individual components, for

example, the reactor design (choice of the shape of the reactor, reactor size and principle of operation) as well as the securing of the cover (closing the high-frequency chamber) can be selected for the desired application, mounted and altered with a minimum expenditure.

[0008] In the Subclaims, the related advantageous design characteristics of the invention are given. Thus, with very simple handling, it is possible to introduce the reactor from the top into the high-frequency chamber and, with this introduction, by securing the cover at the same time, the said pressure-stable cage can be fixed around the reactor as well as above it, as well as with clamping and other holders, the reactor can also be fixed in its position and stabilized in a self-centering and flush manner. Moreover, when closing the cover, the high-frequency chamber is sealed so that it is radiation-safe. This very simple handling expenditure is also true for disassembling and re-equipping (for example, as a flow-through device or for realizing an additional reaction treatment of the material that is being reacted, such as introduction of gas, aeration, among others).

[0009] For this purpose, it is also advantageous when, as a component of the said modular system, a separable upper (preferably connected to the cover of the high-frequency chamber) reaction closure can be provided as well as a replaceable lower reactor closure. For an application-specific mounting of the device, or in the case of a required re-equipping, in this way, an advantageous modular cover, which is provided, can be used for the selected reactor with an upper reactor closure with a pass, as well as a corresponding holding and fixing of the reactor according to the invention with an effective lower reactor closure.

[0010] The invention can be used for batch and flow-through processes and the reactors can be designed both as an individual reactors or as multiple reactor systems with multiple reaction chambers.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The invention will be explained below in more detail with the aid of practical examples shown in the drawing.

[0012] The following are shown:

[0013] Figure 1: Cross-sectional representation of a mounted device with structure and fixing of the pressure-resistant cage around the reactor located in the high-frequency chamber.

[0014] Figure 2: Cross-section of the device according to Figure 1, for the introduction and removal of the reactor into or out of the high-frequency chamber.

[0015] Figure 3: Cross-sectional representation of a device with configuration for flow-through reactions.

[0016] Figure 4: Crown-shaped holder for fixing the reactor in the lower position (top view).

DETAILED DESCRIPTION

[0017] Figure 1 shows a schematic illustration of the device according to the invention in which a reactor 1 is mounted in a high-frequency chamber 2 and is secured through a cover 3 with a screw connection on an upper wall 4 of the high-frequency chamber 2. Rod-like elements 5 are arranged around the reactor 1, which can be secured individually on the upper wall 4 through fixing adapter 6 arranged at the upper end of the rod-like elements 5. For this purpose, each fixing adapter 6 has an upper front threaded bore 7, with which the fixing adapter 6 can be screwed into bores 8 of the upper wall 4 and can be separated again. In the simplest case, each rod-like element 5 can also be screwed in directly to the upper wall 4 without additional fixing adapter 6, for example, a threaded bore on its front side, not shown in the drawing.

[0018] Bores 8 are arranged circularly around an opening 9 (see Figure 2) in the upper wall 4 through which reactor 1 can be introduced into the high-frequency chamber 2 for radiation treatment and then can be removed from it again. In its positive and nonpositive attachment to the upper wall 4, the rod-like elements 5 form a pressure-resistant cage around reactor 1, which have only a minimum adverse influence on the high-frequency radiation used for the radiation treatment of reactor 1, in comparison to a known pressure-resistant protective mantle (in Figure 1, the microwaves MW are shown symbolically by wavy lines). As a result of this, comparatively, a relatively high electrical efficiency of the device is achieved. The

rod-like elements can be fixed individually so that the pressure-resistant cage around reactor 1 can be rebuilt and re-equipped, depending on the purpose of application and application requirements. The realization of this cage can therefore be determined and altered any time regarding the use of the rod-like elements 5 (especially shape, dimension and material) as well as regarding the choice of the number of elements. Depending on the distance and dimensions, plastics, ceramic materials and metals come into consideration as material for the rod-like elements 5 in order to adjust them to the high temperatures, pressure and high-frequency exposure.

[0019] Using an annular flange 10 between the upper wall 4 and the fixing adapter 6, the positive and nonpositive engagement of the rod-like elements 5 can be reinforced.

[0020] In the lower region, each rod-like element 5 has a guide 11 for accepting a crown-shaped holder 12 for reactor 1 or for a lower reactor closure 13. These guides 11 can consist, for example, of narrowing of the material not reaching to the lower end of the rod-like elements 5, into which grooves 14 enter, preferably in a u-shape, formed at the edge of the crown-shaped holder 12 (see Figure 4) but their design is not limited to the above.

[0021] The great advantage of this special structural design is that, in order to mount the device, the crown-shaped holder 12 with its grooves 14 merely has to be introduced into the guides 11 of the rod-like elements 5, and, in the manufacture of the positive and nonpositive attachment of the rod-like elements 5, their position is arrested in a pressure-stable manner by centering and flush self-clamping. In this way, all that has to be done is to fix the rod-like elements 5 with their upper end in bores 8 of the upper wall 4, and then the crown-shaped holder 12 is fixed in its position automatically in the lower region of the rod-like elements 5. In the reverse case, the crown-shaped holder 12 is separated simultaneously with the loosening of the rod-like elements 5 from their position fixed by the holder. The fixing of the rod-like elements 5 is done by screw-connection, as shown in Figure 1. However, fundamentally, here other connections can also be used, which are not shown in the drawing, such as clamps, bayonet-like closures, etc., which make a separable

pressure-stable positive and nonpositive attachment of the rod-like elements 5 possible.

[0022] The reactor unit, consisting of reactor 1, the lower reactor closure 13, an upper reactor closure 15 as well as cover 3, can be introduced into the high-frequency chamber 2 from the top through opening 9 (see Figure 2).

[0023] The cover 3 has screw connections 16 corresponding in position to the bores 8 of the upper wall 4, through which, in the same handling, both the cover 3 itself, for radiation-safe screening of the high-frequency chamber 2, as well as the pressure-resistant cage consisting of the rod-like elements 5, can be secured and mounted. At the same time, as described above, with this fixing, the crown-shaped holder 12 takes up the lower reactor closure 13 for fixing the position of reactor 1. The rod-like elements 5, which are connected to the cover 3 by screwing on the upper wall 4 of the high-frequency chamber 2 through annular flange 10, ensure the closure of the high-frequency chamber 2 as a tight Faraday cage, prevent opening of the cover by lifting when the pressure develops in the high-frequency chamber 2, and thus make it possible to carry out reactions at elevated pressure (for example, up to 400 bar), depending on the material and size of the high-frequency chamber 2.

[0024] The described individual elements of the reactor unit and of the pressure-resistant cage surrounding the reactor 1 as well as cover 3 for the high-frequency chamber 2 can also be provided expediently as components of a modular system.

[0025] In order to make different reactor applications possible, only slight adaptations need to be made on reactor 1 as well as on the lower and upper reactor closures 13, 15. The pressure-resistant cage can also be varied by selection of suitable rod-like elements 5 while maintaining the principle of fixing, and can be adapted to the particular process and reaction conditions.

[0026] For holding of the lower reactor closure 13 in holder 12 more stably in position, this has a cylinder flange 17 on the bottom as guide element, which engages into a cylinder groove 18 of holder 12 when the device is mounted. The design of these guide elements between holder 12 and the lower reactor closures 13, is nevertheless not limited to the characteristics shown here. Other guide elements, such as pegs, bores and conical holding elements, etc., may be used.

[0027] Furthermore, the mounting of the rod-like elements 5, especially for the purpose of rapid and low-cost equipping or change of configuration of the device can be facilitated by additional stop elements, for example, an annular flange 19, where this can be designed at the same time as a guide element for cover 3 and the upper reactor closure 15 and finally also contributes to the stability of the attachment.

[0028] Figure 3 shows an embodiment of the device as a flow-through reactor. For this purpose, here the lower reactor closures 13 are replaced by a reactor closure 13a into which an inlet tube 23 with valve opening and the upper reactor closure 15 is replaced by a reactor closure 15a. With such a low-cost replacement, while keeping the pressure-stable cage function produced by the rod-like elements 5, rapid and uncomplicated re-equipping between batch and flow reactor is possible. In these cases, it is expedient, when, as shown in Figures 1-3, the upper reactor closure 15, 15a is connected in a fixed manner with cover 3 and is provided as a common structural unit of the modular system for mounting and re-equipping. The entire reactor unit, consisting of a tubular reactor 1, cover 3 with the upper reactor closure 15 as well as with the lower reactor closure 13, can then be introduced into the high-frequency chamber 2 as already described and shown in Figure 2 with a few handling steps and can be taken out of it again for easy dismounting or re-equipping. In the dismounted state, with the removal of the reactor unit, the pressure-resistant cage, which is also mounted and separated from the upper wall 4, can be dismounted and similarly re-equipped. Upon (re)introduction of the reactor unit, the entire device (reactor unit and cage) needs to be attached only through screws 16, centering and stabilizing its flushing position and sealed for radiation safety.

[0029] For different purposes of application, it is possible to introduce into reactor 1, through cover 3 and the upper reactor closure 15, additional means for carrying out the reactions and processes described at the outset, such as one or more temperature-measuring probes 20, a gas inlet system 21 as well as infrared probes, cooling devices, mechanical stirrers, samplers, which are not shown in the drawing for the sake of clarity, and can be replaced again. The optional coupling of other equipment through corresponding bores in cover 3 as well as in the upper reactor closure 15 is possible and can be varied; for example, one or several pressure-measuring probes 22 and/or gas inlets and outlets, as well as safety devices, for example, pressure-release

valves or burst disks can be applied or connected; these are not shown in the drawing either, for the sake of clarity. Thus, reactor 1 can be used universally by selection of suitable modular reactor parts (cover 3 with the upper reactor closure 15) and can be constructed or re-equipped very specifically for the application. Here, tubular reactors 1 represent a cost-effective and extremely flexible constructional solution for the reaction container, and this makes it possible to use the most varied materials, such as glass, quartz, ceramics and plastics. These materials are available in numerous sizes and designs in a cost-effective manner.

[0030] The invention is not limited to the individual reactor designs but can also be realized in multireactor systems, for example, reactor inserts with multiple reaction chambers. Furthermore, the type of attachment of cover 3 and the rod-like elements 5 is not limited to the screw connection shown in the drawing.

[0031] List of reference numbers used

1	-	reactor
2	-	high-frequency chamber
3	-	cover
4	-	upper half of the high-frequency chamber
5	-	rod-like element
6	-	fixing adapter
7	-	threaded bore
8	-	bore
9	-	opening
10, 19	-	annular flange
11	-	guide
12	-	crown-shaped holder
13,13 a	-	lower reactor closure
14	-	groove
15,15a	-	upper reactor closure
16	-	screw connection
17	-	cylinder flange
18	-	cylinder groove
20	-	temperature-measuring probe
21	-	gas inlet system
22	-	pressure-measuring probe
23	-	inlet tube with valve
MW	-	microwaves

APPENDIX

SUBSTITUTE SPECIFICATION - VERSION SHOWING CHANGES

~~Description of the Invention~~

TITLE

Device for carrying out chemical reactions and processes in high-frequency fields

TECHNICAL FIELD

[0032] The invention concerns a device for implementing chemical reactions and processes in high-frequency fields. This device permits advantageously the introduction of energy into dissolution, hydrolysis, chemical synthesis, extraction, distillation, drying as well as other reactions and processes.

BACKGROUND

[0033] Frequently, energy input is necessary for the progress, acceleration and/or initiation of chemical reactions and processes. For this purpose, for example, the reaction mixtures are arranged in microwave-permeable reaction containers in a microwave system with a radiation-screened housing and energy is introduced by irradiation with microwaves. Since, in the reactions and processes that occur, frequently high pressures are produced or the reactions proceed only under pressure, the entire arrangement must be pressure-resistant and, for example, must be able to be closed with a cover system. In general, the reaction containers are also equipped with safety equipment and control devices in order to be able to monitor the progress of the chemical reactions and processes.

[0034] Such a device is known, for example, from DE 4 018 955 A1. Among others, a microwave furnace for heating sample material with several pressure-resistant sample containers is described there and the sample containers are arranged on a rotatable carrier part with appropriate holders for the sample containers. In this way, several samples can be treated simultaneously, and, as a result of that, a higher sample throughput can be achieved. A disadvantage is that several pressure-resistant sample containers are needed which can be expensive and thus cost-intensive depending on the design. Furthermore, the reaction volume is limited and, as a rule,

pressure and temperature is measured only in one container, as a result of which the possibilities of application are limited and identical reactions cannot be produced in each individual container because of the inhomogeneities of the microwave field.

[0035] In DE 197 00 499 A1 and in DE 197 48 520 A1, microwave reactor systems are described with a large pressure-resistant holding container in which one or several sampleholders can be arranged in a relatively simple but not necessarily pressure-resistant construction. The disadvantage of this system is the expensive and complicated mounting of the reactor in the microwave oven, the low flexibility, the limited volume and the high expenditure needed for setting up the system.

[0036] Therefore, the task of the invention is to create a device which is suitable for different applications for carrying out chemical reactions and processes in high-frequency fields with high reliability and minimum energy losses, as well as with as little expenditure as possible.

BRIEF SUMMARY

[0037] This task of the invention is solved by providing individual rod or rod-like elements in the high-frequency chamber, and these elements can be attached to the wall of the high-frequency chamber, preferably on the cover of the high-frequency chamber, and form a pressure-resistant cage around the reactor with the analysis material or reagent. This cage for achieving the pressure resistance of the device, which is always required, reduces the high-frequency losses only minimally (depending on the design of the cage), so that, in comparison to the known irradiation devices, a high degree of efficiency is achieved. With the attachment (formation of the positive and nonpositive engagement to the high-frequency chamber or to its cover), at the same time a holder for the reactor is fixed in position, preferably by clamping. In this way, the device can be adapted by suitable selection of the rod-like elements, especially with regard to their number, shape, dimension and material, with a very small economical and operational expenditure, for universal application in the most varied tasks of use (depending on the required pressure-resistance and stability, irradiation treatment, cage-related irradiation losses, among others) and can be equipped and re-equipped within a very short time.

[0038] The possibility that this cage can be realized as a component of a modular system because of its selectable structural design, its individual components, for example, the reactor design (choice of the shape of the reactor, reactor size and principle of operation) as well as the securing of the cover (closing the high-frequency chamber) can be selected for the desired application, mounted and altered with a minimum expenditure.

[0039] In the Subclaims, the related advantageous design characteristics of the invention are given. Thus, with very simple handling, it is possible to introduce the reactor from the top into the high-frequency chamber and, with this introduction, by securing the cover at the same time, the said pressure-stable cage can be fixed around the reactor as well as above it, as well as with clamping and other holders, the reactor can also be fixed in its position and stabilized in a self-centering and flush manner. Moreover, when closing the cover, the high-frequency chamber is sealed so that it is radiation-safe. This very simple handling expenditure is also true for disassembling and re-equipping (for example, as a flow-through device or for realizing an additional reaction treatment of the material that is being reacted, such as introduction of gas, aeration, among others).

[0040] For this purpose, it is also advantageous when, as a component of the said modular system, a separable upper (preferably connected to the cover of the high-frequency chamber) reaction closure can be provided as well as a replaceable lower reactor closure. For an application-specific mounting of the device, or in the case of a required re-equipping, in this way, an advantageous modular cover, which is provided, can be used for the selected reactor with an upper reactor closure with a pass, as well as a corresponding holding and fixing of the reactor according to the invention with an effective lower reactor closure.

[0041] The invention can be used for batch and flow-through processes and the reactors can be designed both as an individual reactors or as multiple reactor systems with multiple reaction chambers.

BRIEF DESCRIPTION OF THE DRAWINGS

[0042] The invention will be explained below in more detail with the aid of practical examples shown in the drawing.

[0043] The following are shown:

[0044] Figure 1: Cross-sectional representation of a mounted device with structure and fixing of the pressure-resistant cage around the reactor located in the high-frequency chamber.

[0045] Figure 2: Cross-section of the device according to Figure 1, for the introduction and removal of the reactor into or out of the high-frequency chamber.

[0046] Figure 3: Cross-sectional representation of a device with configuration for flow-through reactions.

[0047] Figure 4: Crown-shaped holder for fixing the reactor in the lower position (top view).

DETAILED DESCRIPTION

[0048] Figure 1 shows a schematic illustration of the device according to the invention in which a reactor 1 is mounted in a high-frequency chamber 2 and is secured through a cover 3 with a screw connection on an upper wall 4 of the high-frequency chamber 2. Rod-like elements 5 are arranged around the reactor 1, which can be secured individually on the upper wall 4 through fixing adapter 6 arranged at the upper end of the rod-like elements 5. For this purpose, each fixing adapter 6 has an upper front threaded bore 7, with which the fixing adapter 6 can be screwed into bores 8 of the upper wall 4 and can be separated again. In the simplest case, each rod-like element 5 can also be screwed in directly to the upper wall 4 without additional fixing adapter 6, for example, a threaded bore on its front side, not shown in the drawing.

[0049] Bores 8 are arranged circularly around an opening 9 (see Figure 2) in the upper wall 4 through which reactor 1 can be introduced into the high-frequency chamber 2 for radiation treatment and then can be removed from it again. In its positive and nonpositive attachment to the upper wall 4, the rod-like elements 5 form a pressure-resistant cage around reactor 1, which have only a minimum adverse influence on the high-frequency radiation used for the radiation treatment of reactor 1, in comparison to a known pressure-resistant protective mantle (in Figure 1, the microwaves MW are shown symbolically by wavy lines). As a result of this,

comparatively, a relatively high electrical efficiency of the device is achieved. The rod-like elements can be fixed individually so that the pressure-resistant cage around reactor 1 can be rebuilt and re-equipped, depending on the purpose of application and application requirements. The realization of this cage can therefore be determined and altered any time regarding the use of the rod-like elements 5 (especially shape, dimension and material) as well as regarding the choice of the number of elements. Depending on the distance and dimensions, plastics, ceramic materials and metals come into consideration as material for the rod-like elements 5 in order to adjust them to the high temperatures, pressure and high-frequency exposure.

[0050] Using an annular flange 10 between the upper wall 4 and the fixing adapter 6, the positive and nonpositive engagement of the rod-like elements 5 can be reinforced.

[0051] In the lower region, each rod-like element 5 has a guide 11 for accepting a crown-shaped holder 12 for reactor 1 or for a lower reactor closure 13. These guides 11 can consist, for example, of narrowing of the material not reaching to the lower end of the rod-like elements 5, into which grooves 14 enter, preferably in a u-shape, formed at the edge of the crown-shaped holder 12 (see Figure 4) but their design is not limited to the above.

[0052] The great advantage of this special structural design is that, in order to mount the device, the crown-shaped holder 12 with its grooves 14 merely has to be introduced into the guides 11 of the rod-like elements 5, and, in the manufacture of the positive and nonpositive attachment of the rod-like elements 5, their position is arrested in a pressure-stable manner by centering and flush self-clamping. In this way, all that has to be done is to fix the rod-like elements 5 with their upper end in bores 8 of the upper wall 4, and then the crown-shaped holder 12 is fixed in its position automatically in the lower region of the rod-like elements 5. In the reverse case, the crown-shaped holder 12 is separated simultaneously with the loosening of the rod-like elements 5 from their position fixed by the holder. The fixing of the rod-like elements 5 is done by screw-connection, as shown in Figure 1. However, fundamentally, here other connections can also be used, which are not shown in the drawing, such as clamps, bayonet-like closures, etc., which make a separable

pressure-stable positive and nonpositive attachment of the rod-like elements 5 possible.

[0053] The reactor unit, consisting of reactor 1, the lower reactor closure 13, an upper reactor closure 15 as well as cover 3, can be introduced into the high-frequency chamber 2 from the top through opening 9 (see Figure 2).

[0054] The cover 3 has screw connections 16 corresponding in position to the bores 8 of the upper wall 4, through which, in the same handling, both the cover 3 itself, for radiation-safe screening of the high-frequency chamber 2, as well as the pressure-resistant cage consisting of the rod-like elements 5, can be secured and mounted. At the same time, as described above, with this fixing, the crown-shaped holder 12 takes up the lower reactor closure 13 for fixing the position of reactor 1. The rod-like elements 5, which are connected to the cover 3 by screwing on the upper wall 4 of the high-frequency chamber 2 through annular flange 10, ensure the closure of the high-frequency chamber 2 as a tight Faraday cage, prevent opening of the cover by lifting when the pressure develops in the high-frequency chamber 2, and thus make it possible to carry out reactions at elevated pressure (for example, up to 400 bar), depending on the material and size of the high-frequency chamber 2.

[0055] The described individual elements of the reactor unit and of the pressure-resistant cage surrounding the reactor 1 as well as cover 3 for the high-frequency chamber 2 can also be provided expediently as components of a modular system.

[0056] In order to make different reactor applications possible, only slight adaptations need to be made on reactor 1 as well as on the lower and upper reactor closures 13, 15. The pressure-resistant cage can also be varied by selection of suitable rod-like elements 5 while maintaining the principle of fixing, and can be adapted to the particular process and reaction conditions.

[0057] For holding of the lower reactor closure 13 in holder 12 more stably in position, this has a cylinder flange 17 on the bottom as guide element, which engages into a cylinder groove 18 of holder 12 when the device is mounted. The design of these guide elements between holder 12 and the lower reactor closures 13, is nevertheless not limited to the characteristics shown here. Other guide elements, such as pegs, bores and conical holding elements, etc., may be used.

[0058] Furthermore, the mounting of the rod-like elements 5, especially for the purpose of rapid and low-cost equipping or change of configuration of the device can be facilitated by additional stop elements, for example, an annular flange 19, where this can be designed at the same time as a guide element for cover 3 and the upper reactor closure 15 and finally also contributes to the stability of the attachment.

[0059] Figure 3 shows an embodiment of the device as a flow-through reactor. For this purpose, here the lower reactor closures 13 are replaced by a reactor closure 13a into which an inlet tube 23 with valve opening and the upper reactor closure 15 is replaced by a reactor closure 15a. With such a low-cost replacement, while keeping the pressure-stable cage function produced by the rod-like elements 5, rapid and uncomplicated re-equipping between batch and flow reactor is possible. In these cases, it is expedient, when, as shown in Figures 1-3, the upper reactor closure 15, 15a is connected in a fixed manner with cover 3 and is provided as a common structural unit of the modular system for mounting and re-equipping. The entire reactor unit, consisting of a tubular reactor 1, cover 3 with the upper reactor closure 15 as well as with the lower reactor closure 13, can then be introduced into the high-frequency chamber 2 as already described and shown in Figure 2 with a few handling steps and can be taken out of it again for easy dismounting or re-equipping. In the dismounted state, with the removal of the reactor unit, the pressure-resistant cage, which is also mounted and separated from the upper wall 4, can be dismounted and similarly re-equipped. Upon (re)introduction of the reactor unit, the entire device (reactor unit and cage) needs to be attached only through screws 16, centering and stabilizing its flushing position and sealed for radiation safety.

[0060] For different purposes of application, it is possible to introduce into reactor 1, through cover 3 and the upper reactor closure 15, additional means for carrying out the reactions and processes described at the outset, such as one or more temperature-measuring probes 20, a gas inlet system 21 as well as infrared probes, cooling devices, mechanical stirrers, samplers, which are not shown in the drawing for the sake of clarity, and can be replaced again. The optional coupling of other equipment through corresponding bores in cover 3 as well as in the upper reactor closure 15 is possible and can be varied; for example, one or several pressure-measuring probes 22 and/or gas inlets and outlets, as well as safety devices, for example, pressure-release

valves or burst disks can be applied or connected; these are not shown in the drawing either, for the sake of clarity. Thus, reactor 1 can be used universally by selection of suitable modular reactor parts (cover 3 with the upper reactor closure 15) and can be constructed or re-equipped very specifically for the application. Here, tubular reactors 1 represent a cost-effective and extremely flexible constructional solution for the reaction container, and this makes it possible to use the most varied materials, such as glass, quartz, ceramics and plastics. These materials are available in numerous sizes and designs in a cost-effective manner.

[0061] The invention is not limited to the individual reactor designs but can also be realized in multireactor systems, for example, reactor inserts with multiple reaction chambers. Furthermore, the type of attachment of cover 3 and the rod-like elements 5 is not limited to the screw connection shown in the drawing.

[0062] List of reference numbers used

1	-	reactor
2	-	high-frequency chamber
3	-	cover
4	-	upper half of the high-frequency chamber
5	-	rod-like element
6	-	fixing adapter
7	-	threaded bore
8	-	bore
9	-	opening
10, 19	-	annular flange
11	-	guide
12	-	crown-shaped holder
13,13 a	-	lower reactor closure
14	-	groove
15,15a	-	upper reactor closure
16	-	screw connection
17	-	cylinder flange
18	-	cylinder groove
20	-	temperature-measuring probe
21	-	gas inlet system
22	-	pressure-measuring probe
23	-	inlet tube with valve
MW	-	microwaves

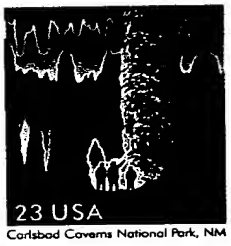
27392/24963 11/13/03

The Patent Office is hereby requested to acknowledge receipt of the following papers by stamping and returning this card.

Lautenschlager et al.
09/980,026

Amendment in Response to the Office action dated October 2, 2003

w/certificate of mailing dated November 13, 2003



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/980,026	03/29/2002	Werner Lautenschlager	27392/24963	3016

7590 06/16/2004

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EXAMINER	
MAYEKAR, KISHOR	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 06/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Notice of Abandonment	Application No.	Applicant(s)	
	09/980,026	LAUTENSCHLAGER ET AL.	
	Examiner	Art Unit	
	Kishor Mayekar	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on Oct. 2, 2003.
   (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
   (b) ☐ A proposed reply was received on _____, but it does not constitute a proper reply under 37 CFR 1.113 (a) to the final rejection.
   (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).
   (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
   (d) ☒ No reply has been received. *

2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
   (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
   (b) ☐ The submitted fee of $_____ is insufficient. A balance of $_____ is due.
   The issue fee required by 37 CFR 1.18 is $_____. The publication fee, if required by 37 CFR 1.18(d), is $_____.
   (c) ☐ The issue fee and publication fee, if applicable, has not been received.

3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
   (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
   (b) ☐ No corrected drawings have been received.

4. ☐ The letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.

5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.

6. ☐ The decision by the Board of Patent Appeals and Interference rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.

7. ☐ The reason(s) below:

* Verified the abandonment w/ Att. A. Sitko on 6/14/04.

Kishor Mayekar
Primary Examiner
Art Unit: 1753

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.